04DS1
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PURCHASE DESCRIPTION

SYNTHESIZED SWEEP GENERATOR 10 MHz to 20 GHz

GEIRU-F

1.0 GENERAL This procurement requires a synthesized microwave sweeper/signal generator capable of generating signals over the frequency range of 10 MHz to 20 GHz with analog sweep capabilities as well as internal and external modulation capabilities.

2.0 CLASSIFICATION The equipment shall meet the requirements of MIL-T-28800( ), Type III, Class 5, Style E, Color R for Navy shipboard, submarine and shore applications with the following modifications and exceptions:

a. The non-operating temperature requirement is limited to the range of -40°C to +70°C.

b. The relative humidity requirement is limited to 95% non-condensating.

c. The Electromagnetic Interference requirements of MIL-T-28800(D) are limited to CE01 (relaxed 20 dB), CE03 (broadband limits relaxed 20 dB below 200 kHz), CS01, CS02 (0.05 to 100 MHz), CS06, RE01 (0.03 to 15 kHz), RE02 (14 kHz to 1 GHz) and RS03.

d. Spurious signals and output noise requirements need NOT be complied with during vibrational testing.

e. The warm-up time is extended to one hour.

3.0 OPERATIONAL REQUIREMENTS The equipment shall be capable of generating signals within the parameters and accuracies specified herein.

3.1 Frequency Characteristics (CW Mode)

3.1.1 Range: At least 10 MHz to 20 GHz

3.1.2 Display/Resolution: At least 1 Hz {F < 20 GHz}

3.1.3 Accuracy: Equal to accuracy of reference standard (CW mode)

3.1.4 Stability (Equal to or better than limits specified below)

3.1.4.1 Internal: Less than 1 pp 10^9/hr at 25°C ± 5°C after one hour warmup

3.1.4.2 External: 10 MHz input; stability equal to external standard frequency stability

3.1.4.3 Temperature: Less than ±2 parts in 10^6 change over 0 to 50°C temperature range

3.1.5 Residual Modulation (CW mode in 50 Hz to 15 kHz detection BW)

3.1.5.1 FM: Less than 500 Hz rms

3.1.5.2 AM: Less than 0.50% pk

3.1.6 Spectral Purity {F = carrier frequency}

3.1.6.1	Harmonic/Sub-harmonic: < -50 dBc	2.2 GHz ≤ F < 20 GHz
3.1.6.2	Non-harmonics/Spurious (≥ 10 kHz from carrier): < -55 dBc	2.2 GHz ≤ F < 20 GHz
3.1.6.3	Phase Noise: < -75 dBc/Hz at 10 kHz offset from carrier	

3.1.7 Analog Sweep (ΔF = peak sweep offset about CF)

3.1.7.1 Sweep Width: 1 MHz to full band

3.1.7.1.1 Resolution: < 0.1% of swp width

3.1.7.2 Functions: Start/Stop, CW, CF-ΔF, Marker

3.1.7.3 Trigger: Internal (automatic), External, Single, Manual

3.1.7.4 Frequency Markers: At least 5; both amplitude and frequency

3.1.7.5 Sweep Time: Adjustable from at least 30 msec to 99 sec

3.2 Output Characteristics

3.2.1 Range: +10 dbm {.05 to 20 GHz} to -110 dBm

3.2.2 RF Output: Leveled output shall be available at +10 dBm or less.

3.2.3 Accuracy: ± 1.5 dB for output levels from +10 dBm to -90 dBm; additional 0.2 dB/10 dB step for levels below -90 dBm

3.2.4 Display/Resolution: Digital display / minimum resolution of 0.1 dB

3.2.5 Flatness: ±1.5 dB measured at an output level of +0 dBm

3.2.6 Impedance/Connector: 50 ohms; Type N
3.2.6.1 VSWR: The maximum VSWR of the output connector shall be no greater than 2:1.

3.2.7 Power Sweep
3.2.7.1 Range: ≥ 20 dB variation; offset set by step attenuator
3.2.7.2 Accuracy: Same as output accuracy
3.2.7.3 Minimum step size: 0.1 dB or less
3.2.7.4 Sweep time: Variable to 99 sec

3.3 Modulation Characteristics
3.3.1 Pulse Modulation
3.3.1.1 Internal

3.3.1.1.1 Rate (PRF): At least 10 Hz to 1 MHz
3.3.1.1.2 Width (PW): 25 nsec to 100 msec
3.3.1.1.3 Rise/Fall times: Less than 10 nanoseconds
3.3.1.1.4 ON/OFF Ratio: Greater than 80 dB
3.3.1.1.5 Delay: At least 250 nanoseconds to 100 milliseconds
3.3.1.1.5.1 Accuracy: 10 nsec or 10% of setting
3.3.1.1.5.2 Sync Pulse Output TTL compatible; risetime less than 50 nanoseconds
3.3.1.1.5.3 Video Pulse Output: TTL compatible; width corresponds to PW control setting
3.3.1.1.6 External Trigger Input: TTL compatible; at least 10 Hz to 1 MHz, provides sync rate for pulse modulation
3.3.1.1.7 Display/Resolution: Digital display PW, PRF, and Delay / 3 digit min (floating point)

3.3.1.2 External
3.3.1.2.1 Rate (PRF): At least 10 Hz to 1 MHz
3.3.1.2.2 Width (PW): Greater than 100 nsec
3.3.1.2.3 Video Output: TTL compatible pulse; same PW and PRF as external input pulse
3.3.1.2.4 Pulse Input: TTL compatible
3.3.1.3 Triggering: Rising or falling edge
3.3.1.4 Sync Output: Modulation waveform, TTL compatible

3.3.2 Amplitude Modulation (AM) [RF Level ≤ 0 dBm]
3.3.2.1 Internal AM
3.3.2.1.1 Rate: At least 10 Hz to 100 kHz (AM rate, a precise integer, must be synthesized from the reference with the same stability and accuracy)
3.3.2.1.2 Depth: 0 to 90% minimum
3.3.2.1.2.1 Accuracy: ± 5% [50% depth @ 1 kHz]
3.3.2.1.3 Distortion: ≤ 5% [50% depth @ 1 kHz]
3.3.2.1.4 Display/Resolution: Digital display AM Depth and Rate

3.3.2.2 External AM
3.3.2.2.1 Rates: At least 10 Hz to 100 kHz (3 dB bandwidth)

3.3.2.2.2 Depth: 0 to 90% minimum
3.3.2.2.3 Distortion: ≤ 5% [50% depth @ 1 kHz]
3.3.2.2.4 Sensitivity: 1 Vpk for at least 90% depth

3.3.3 Frequency Modulation (FM) {F = carrier freq / ΔF = peak freq deviation}
{F locked / unlocked}
3.3.3.1 Internal FM
3.3.3.1.1 Rate: At least 10 Hz to 100 kHz (FM rate, a precise integer, must be synthesized from the reference with the same stability and accuracy)
3.3.3.1.2 FM Deviation: 10 kHz to at least 5 MHz peak
3.3.3.1.3 FM Accuracy: ±10% [ΔF ≥ 50 kHz]
3.3.3.1.4 Incidental AM: ≤ 0.3% (50 Hz - 15 kHz BW) [ΔF = 50 kHz @ 1 kHz]
3.3.3.1.5 Residual FM (FM mode): ≤ 3000 Hz rms (0.05-15 kHz BW) [ΔF = 0.0 kHz @ 1 kHz]
3.3.3.1.6 Display/Resolution: Digital display FM Dev and Rate / 3 digit min (floating point)

3.3.3.2 External FM
3.3.3.2.1 Rates: At least 10 Hz to 1 MHz [3 dB BW]
3.3.3.2.2 FM Deviation: 10 kHz to at least 5 MHz peak
3.3.3.2.3 FM Accuracy: ±10% [ΔF ≥ 50 kHz]
3.3.3.2.4 Distortion: ≤ 5% [300 kHz dev at 50 kHz]
3.3.3.2.5 Sensitivity: At least 1 MHz/volt

4.0 GENERAL REQUIREMENTS

4.1 Power Source 115 and 230 Vac (±10%), single phase, at frequencies of 50 and 60 Hz (±10%); and 115 Vac (±10%) single phase, at frequency of 400 Hz (±10%), 400 watts maximum.

4.2 Lithium Batteries Per MIL-T-28800, lithium batteries are prohibited without prior authorization. Requests for approving the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.

4.3 Dimensions The total volume shall not exceed 49,200 cm^3 (3,000 in^3).

4.4 Weight The overall weight of the unit shall not exceed 29.5 kg (65 lb).

4.5 Calibration Interval The calibration interval shall be 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a 72% or greater confidence factor following a calibration interval of 12 months.

4.6 Remote Operation The unit will be capable of remote operation via IEEE-488( ) bus interface. It shall operate as a talker or listener such that all functions except the power on/off switch are controllable and shall have as a minimum the following subset of GPIB commands: AH1, SH1, T6, L4, SR1, RL1, DC1.